

## CLAIMS

We claim:

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1. A method of typing resources, including one or more first resources, in a distributed system executable over a computer network, the method comprising:  
for each first resource, associating one or more first descriptions with  
corresponding first resources, wherein at least one of the first resources is discoverable  
10 using a corresponding first description; and  
for each first description, associating a first explanation with a corresponding first description, wherein the first resource is discoverable using a corresponding first explanation.
  - 15 2. The method of Claim 1, wherein one or more of the first explanations are supplied by the distributed infrastructure.
  3. The method of Claim 1, wherein the first explanations are second resources separate from the first resources.
  - 20 4. The method of Claim 1, wherein:  
each first description includes one or more first attributes describing the first resource; and  
for each first description, each first explanation includes one or more first  
25 attribute properties explaining the first attributes.
  5. The method of Claim 1, wherein the resources further include second resources, further comprising:  
for each first explanation that is not supplied by the distributed infrastructure:  
30 associating one or more second descriptions with corresponding the first explanation, wherein the first explanation is discoverable using the second description; and

for each second description, associating a second explanation with the second description, wherein the first explanation is discoverable using the second explanation.

5           6.       The method of Claim 5, wherein one or more of the second explanations are supplied by the distributed infrastructure.

          7.       The method of Claim 5, wherein the first explanations are second resources separate from the first resources.

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          8.       The method of Claim 5, wherein:  
                  each second description includes one or more second attributes describing the first explanation; and

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                  for each second description, each second explanation explaining the second description includes one or more second attribute properties defining the second attributes.

          9.       The method of Claim 1, wherein the resources further include third resources, further comprising:

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                  for each first resource, associating one or more first access data for accessing the first resource, wherein the first resource is discoverable using the first access data.

          10.      The method of Claim 9, wherein one or more of the first access data are supplied by the distributed infrastructure.

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          11.      The method of Claim 9, wherein the first access data are third resources.

          12.      The method of Claim 9, wherein the resources further include fourth resources, further comprising:

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                  for each first access data, if the first access data is not supplied by the distributed infrastructure:

                          associating a third description with the first access data, wherein the first access data is discoverable using the third description; and

associating a third explanation explaining the third description, wherein the access data is discoverable using the third explanation.

13. The method of Claim 9, wherein the first access data are fourth resources.

14. The method of Claim 12, wherein:

each third description includes one or more third attributes describing the first access data; and

for each third description, each third explanation explaining the third description includes one or more third attribute properties defining the third attributes.

15. The method of Claim 12, wherein the resources further include fifth resources, further comprising:

for each first access data, if the first access data is not supplied by the distributed infrastructure, then providing a second access data supplied by the distributed infrastructure for accessing the first access data.

16. The method of Claim 15, wherein the second access data is a fifth resource.

17. A method of discovering one or more target resources in a distributed system executable over two or more computers interconnected by a computer network, the distributed system including an infrastructure executable on each computer connecting the resources, the resources including service, vocabulary and contract resources, the method comprising:

receiving a search request for the target resources from a client, including a target description describing the target resources;

searching a database of resource information, wherein the resource information includes:

one or more resource descriptions describing associated resources, explanatory information explaining the resource descriptions, and access data for accessing the associated resource;

determining whether one or more resource descriptions match the target description; and

sending result information about matching resources to the client.

18. The method of Claim 17, wherein the request is received from a locally connected client.

5 19. The method of Claim 17, wherein the request is received from a remote computer over the computer network.

20. The method of Claim 17, wherein:  
the target description includes a reference to the target resource.

10 21. The method of Claim 17, wherein:  
the target description includes target attributes describing the target resources;  
the resource descriptions include resource attributes describing the resources; and  
determining whether one or more resource descriptions match the target  
15 description includes comparing the attributes in the target description with the attributes in the resource descriptions.

22. The method of Claim 21, wherein:  
the target description includes a query describing a relationship among the  
20 attributes; and  
determining whether one or more resource descriptions match the target  
description includes comparing the relationship among attributes described by the query with the relationship among attributes described in the resource descriptions.

25 23. The method of Claim 17, further comprising:  
if the target description includes a reference to a contract resource to which the target resources are typed, then searching only resource information in the database typed to the contract resource.

30 24. The method of Claim 17, further comprising:  
if the target description includes a reference to a vocabulary resource to which the target resources are typed, then searching only resource information in the database typed to the vocabulary resource.

25. The method of Claim 17, wherein:

if the target description includes a reference to a vocabulary resource and to a contract resource to which the target resources are typed, then searching only resource  
5 information in the database typed to the vocabulary resource and the contract resource.

26. The method of Claim 17, wherein the result information includes references to the matching resources.

10 27. The method of Claim 26, wherein the references include URLs to the matching resources.

28. The method of Claim 17, wherein the result includes interface data for accessing the matching resources.

15 29. The method of Claim 28, wherein the interface data includes the set of IDL interfaces supported by each matching resource.

20 30. The method of Claim 28, wherein the interface data includes stub classes for invoking methods on the matching resources.

31. A computer system for typing resources in a distributed system executable over a computer network, the distributed system including one or more first resources, the system comprising:

25 at least two computers connected over the computer network; and  
a computer program executable on each computer generating processes accessible to at least one other computer over the computer network;

wherein the computer programs further comprises computer instructions for:

for each first resource, associating one or more first descriptions with  
30 corresponding first resources, wherein at least one of the first resources is discoverable using a corresponding first description; and

for each first description, associating a first explanation with a corresponding first description, wherein the first resource is discoverable using a corresponding first explanation.

5           32.    The computer system of Claim 31, wherein one or more of the first explanations are supplied by the distributed infrastructure.

          33.    The computer system of Claim 31, wherein the first explanations are second resources.

10           34.    The computer system of Claim 31, wherein:  
              each first description includes one or more first attributes describing the first resource; and  
              for each first description, each first explanation explaining the first description  
15           includes one or more first attribute properties defining the first attributes.

          35.    The computer system of Claim 31, wherein the resources further include second resources, and the computer program further comprises computer instructions for:

              for each first explanation that is not supplied by the distributed infrastructure,  
20           then:

              associating one or more second descriptions with the first explanation,  
              wherein the first explanation is discoverable using the second description; and  
              for each second description, associating a second explanation explaining  
25           the second description, wherein the first explanation is discoverable using the second explanation.

          36.    The computer system of Claim 35, wherein one or more of the second explanations are supplied by the distributed infrastructure.

30           37.    The computer system of Claim 35, wherein the first explanations are second resources.

          38.    The computer system of Claim 35, wherein:

each second description includes one or more second attributes describing the first explanation;

for each second description, each second explanation explaining the second description includes one or more second attribute properties defining the second attributes.

39. The computer system of Claim 31, wherein the resources further include third resources, and the computer program further comprises computer instructions for:

for each first resource, associating one or more first access data for accessing the first resource, wherein the first resource is discoverable using the first access data.

40. The computer system of Claim 39, wherein one or more of the first access data are supplied by the distributed infrastructure.

41. The computer system of Claim 9, wherein the first access data are third resources.

42. The computer system of Claim 39, wherein the resources further include fourth resources, and the computer program further comprises computer instructions for:

for each first access data, if the first access data is not supplied by the distributed infrastructure, then:

associating a third description with the first access data, wherein the first access data is discoverable using the third description; and

associating a third explanation explaining the third description, wherein the access data is discoverable using the third explanation.

43. The computer system of Claim 39, wherein the first access data are fourth resources.

44. The computer system of Claim 42, wherein:

each third description includes one or more third attributes describing the first access data;

for each third description, each third explanation explaining the third description includes one or more third attribute properties defining the third attributes.

45. The computer system of Claim 42, wherein the computer program further comprises computer instructions for:

for each first access data, if the first access data is not supplied by the distributed infrastructure, then providing a supplied by the distributed infrastructure second access data for accessing the first access data.

46. The computer system of Claim 45, wherein the supplied by the distributed infrastructure second access data is a fifth resource.

47. A computer system for discovering one or more target resources in a distributed system executable over two or more computers interconnected by a computer network, the distributed system including an infrastructure executable on each computer connecting the resources, the resources including service, vocabulary and contract resources, the computer system comprising:

at least two computers connected over the computer network; and

a computer program executable on each computer generating processes accessible to at least one other computer over the computer network;

wherein the computer programs further comprises computer instructions for:

receiving a search request for the target resources from a client, including a target description describing the target resources;

searching a database of resource information, wherein the resource information includes:

one or more resource descriptions describing associated resources, explanatory information explaining the resource descriptions, and access data for accessing the associated resource;

determining whether one or more resource descriptions match the target description; and

sending result information about matching resources to the client.

48. The computer system of Claim 47, wherein the request is received from a locally connected client.



49. The computer system of Claim 47, wherein the request is received from a remote computer over the computer network.

50. The computer system of Claim 47, wherein:  
the target description includes a reference to the target resource.

51. The computer system of Claim 47, wherein:  
the target description includes target attributes describing the target resources;  
the resource descriptions include resource attributes describing the resources; and  
determining whether one or more resource descriptions match the target  
description includes comparing the attributes in the target description with the attributes  
in the resource descriptions.

52. The computer system of Claim 51, wherein:  
the target description includes a query describing a relationship among the  
attributes; and  
determining whether one or more resource descriptions match the target  
description includes comparing the relationship among attributes described by the query  
with the relationship among attributes described in the resource descriptions.

53. The computer system of Claim 47, wherein the computer program further  
comprises computer instructions for:  
if the target description includes a reference to a contract resource to which the  
target resources are typed, then searching only resource information in the database typed  
to the contract resource.

54. The computer system of Claim 47, wherein the computer program further  
comprises computer instructions for:  
if the target description includes a reference to a vocabulary resource to which the  
target resources are typed, then searching only resource information in the database typed  
to the vocabulary resource.

55. The computer system of Claim 47, wherein:

if the target description includes a reference to a vocabulary resource and to a contract resource to which the target resources are typed, then searching only resource information in the database typed to the vocabulary resource and the contract resource.

5           56.     The computer system of Claim 47, wherein the result information includes references to the matching resources.

          57.     The computer system of Claim 56, wherein the references include URLs to the matching resources.

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          58.     The computer system of Claim 47, wherein the result includes interface data for accessing the matching resources.

          59.     The computer system of Claim 58, wherein the interface data includes the set of  
15 IDL interfaces supported by each matching resource.

          60.     The computer system of Claim 58, wherein the interface data includes stub classes for invoking methods on the matching resources.